Responses to U.S. Environmental Protection Agency and Colorado Department of Public Health and Environment Comments on Operable Unit 7 Draft IM/IRA Decision Document

DRAFT

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U S Department of Energy
Rocky Flats Environmental Technology Site
Golden, Colorado

EPA/PRC Environmental Management, Inc
Technical Review of Phase I IM/IRA Decision Document for Operable Unit 7
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Executive Summary

The Interim Measures/Interim Remedial Action (IM/IRA) decision document for Operable Unit (OU) 7 (OU7DD) provides the basis for closing a portion of OU7 under the presumptive remedy approach Presumptive remedies are preferred technologies for common categories of sites based on historical patterns of remedy selection and EPA s scientific and engineering evaluation of performance data on technology implementation (EPA 1993) The objective of the presumptive remedy approach is to streamline the site investigation and remedial action selection for sites that fit these categories The OU7DD concludes that the presumptive remedy for landfills—containment—will address all pathways with the exception of surface water and sediment in the East Landfill Pond and surface soils in the spray evaporation areas The OU7DD presents a focused risk assessment for these pathways and concludes that there is no risk above acceptable range associated with these pathways The most serious deficiencies identified in the OU7DD are with the methodology and conclusions of the focused risk assessment These deficiencies can be grouped as follows

Comment 1

Methodologies to evaluate both human health and ecological risks are unacceptable Several complete exposure pathways were not considered in the human health risk assessment in the OU7DD In addition many human health risk assessment methods do not conform to EPA guidance (EPA 1989 1991a) In particular the use of invalidated data and comparison of mean chemical concentrations to applicable or relevant and appropriate requirements (ARARs) Unless these deficiencies are corrected risk to human receptors may be significantly underestimated The conclusion that there is no risk to wildlife at the East Landfill Pond surface water and sediments was arbitrary in that it contradicted the results of the focused risk assessment for these media and it was based on incorrect water quality standards

Response

For the revised document human health risks have been evaluated for the open space exposure scenario only because this is the anticipated future land use for the area surrounding the landfill as recommended by the Future Land Use Working Group (DOE 1995) Exposure pathways for occupational scenarios are incomplete because industnal development at OU 7 will not be possible due to land use restrictions (deed restrictions and/or state orders) after construction of the landfill cap The ecological worker scenario was not evaluated because the open space scenario is more conservative

Risks will be recalculated using validated data only (i e eliminating 1990 data) Mean chemical concentrations as well as maximum values and 95 percent upper confidence limits on the means (UCL_{95}), will be compared to applicable or relevant and appropriate requirements (ARARs) in the Draft Final IM/IRA DD If the maximum or UCL_{95} is above an ARAR but the mean is not outlier testing and professional judgment will be used to determine potential contaminants of concern (PCOCs)

The only incorrect water quality standard was for arsenic This will be corrected in the revised document

Comment 2

The OU7DD does not discuss where leachate will discharge after construction of the cap and whether it will continue to be treated A project is currently underway to install a passive seep collection and treatment system The treatment system will be dismantled prior to cap construction The document asserts that capping the landfill will cover the landfill seep (where leachate that has been identified as

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Resource Conservation and Recovery Act [RCRA]-listed F039 waste discharges) thus eliminating exposure to the seep The document states that a gravel blanket or French drain beneath the general fill layer will prevent the leachate from building up and creating a new seep However, the OU7DD does not specify where the new discharge point will be located Instead the document emphasizes that the landfill cap and slurry wall will diminish flow into the landfill to the point where the seep will eventually dry up Groundwater modeling results provided with the document suggest that leachate will continue to discharge in excess of 1 gallon per minute (gpm) for approximately 5 years after the cap is constructed and will be flowing at a rate of 0 4 gpm 24 years after the cap is constructed

Response

Based on agreements between DOE, EPA, and CDPHE the Draft Final IM/IRA DD will recommend complete removal of the East Landfill Pond Leachate contained-in groundwater will continue to be generated from the landfill mass for several years but it will remain in the subsurface and will not be discharged to surface water The leachate might be treated for those contaminants that either currently exceed or will exceed (based on modeling) ARARs at the Point of Compliance However under currently expected land uses and agreed-upon exposure scenarios (open-space scenario), there are no exposures to groundwater unless it surfaces in seeps, streams, or ponds The unnamed tributary of Walnut Creek (No Name Gulch) is a losing stream year-round, based on the following three facts.

1 *A search of RFEDS for the four surface water stations below the landfill pond on No Name Gulch (SW014 SW111, SW110, and SW015 from west to east) yields either no flow information or dry conditions Conversations with field personnel who sampled No Name Gulch during storm events confirm that no observable surface water flow exists*

2 *Based on a detailed study of Woman Creek's surface water/groundwater interaction the location and subsurface geomorphology of No Name Gulch indicates the stream is a losing reach In the Woman Creek study the only reaches that either gained year-round or seasonally were located at the western portion of RFETS' buffer zone and were adjacent to large pediments containing substantial subsurface flows The few isolated gaining reaches that do not meet the above criteria are fed by localized seeps and are spatially quite small A field survey indicates no substantial seeps flowing into No Name Gulch below the current landfill pond*

3 *Two fully dynamic surface water flow models (including the EPA model Hydrologic Simulation Program Fortran) have also been developed for the Walnut and Woman Creek basins In some of the pervious land segments of these models, subsurface and/or surface seep flow time series were required to be added to pervious land segments to calibrate the stream hydrographs This addition of water to a basin indicates a substantial interaction of the reach with groundwater No external flow time series were required to be added to the pervious land basin containing No Name Gulch By inference, this tends to support the conclusion that No Name Gulch is a losing reach*

Comment 3

The status of the East Landfill Pond is unclear The pond has received a RCRA-listed F039 waste in the past and apparently will continue to do so for some time into the future Groundwater modeling results suggest that the landfill will still be discharging leachate 24 years into the future Because of deficiencies in the focused risk assessment approach, it is premature to assume that the RCRA-listed F039 waste can be delisted in the near future Therefore it appears that the East Landfill Pond will have to be managed as an active RCRA surface impoundment at least in the near future

Response

Based on agreements between DOE, EPA, and CDPHE the Draft Final IM/IRA DD will recommend complete removal of the East Landfill Pond The Draft Final IM/IRA DD will recommend removal of the

East Landfill Pond However, because surface water in the East Landfill Pond passes the CDPHE conservative screen (as shown in the preliminary PRG screen using residential receptors) the pond water is not F039 multi source leachate The point at which the water passes the screen is the point at which the water is no longer managed under RCRA

This technical review also identifies several landfill design issues These comments highlight aspects of design that PRC believes should be reconsidered or closely examined as the presumptive remedy moves into the design stage

1 0 Introduction

At the request of the U S Environmental Protection Agency (EPA) PRC Environmental Management Inc (PRC) has conducted a technical review of the Phase I Interim Measures/Interim Remedial Action (IM/IRA) Decision Document for Operable Unit 7 (OU7) at the U S Department of Energy (DOE) Rocky Flats Environmental Technology Site (RFETS) OU7 comprises the following Individual Hazardous Substance Sites (IHSSs) the Present Landfill (IHSS 114) the Inactive Hazardous Waste Storage Area (IHSS 203) the Pond Area Spray Field (IHSS 167 2) and the South Area Spray Field (IHSS 167 3) The IM/IRA Decision Document for OU7 (OU7DD) was submitted by Kaiser Hill on behalf of DOE on August 24 1995 General comments are presented in Section 2 0 General Comments pertain to the document as a whole or to multiple sections of the document Specific comments are presented in Section 3 0 Specific comments are keyed to a particular page paragraph table or figure Where PRC found similar problems in several sections of the report, a general comment was provided to avoid redundancy Typographical and editorial errors within the OU7 work plan have not been addressed

2 0 General Comments

This section presents general comments on the human health risk assessment (HHRA) the ecological risk assessment the landfill design groundwater modeling and applicable or relevant and appropriate requirements (ARARs)

2 1 Human Health Risk Assessment

Comment 1

Several parameters used in the exposure calculations should be eliminated because there is insufficient supporting information and they could cause the estimated intakes of chemicals of concern (COCs) to be significantly underestimated Exposure parameters that should not be used include the matrix effect (ME) respirable fraction (RF) and respiratory deposition factor (DF)

The ME was used to account for decreased absorption of COCs in the gastrointestinal (GI) tract due to decreased bioavailability In addition no explanation is provided to support the ME value which is used to estimate intake ME factors depend on the specific soil type in the OU At a minimum the soil type on which the ME is based should be compared to site specific soil conditions If soil types are dissimilar then the ME cannot be used in estimating intakes EPA has previously requested that ME factors be submitted for approval prior to use in the risk assessment Until there is EPA concurrence the ME factor should not be used in the exposure equation to estimate risk

The RF value is used to estimate respirable particles (PM 10) in the air due to fugitive dust emissions from surficial soils This relationship however is accounted for in the particulate emission factor (PEF) which was used in the exposure equation The RF parameter should be eliminated from the intake factor equation Use of the RF value inappropriately decreases exposure concentrations

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The DF variable accounts for the fraction of inhaled particulates retained in the lung This parameter adjusts the chronic daily intake (CDI) in such a manner that only 85 percent of inhaled particulates are accounted for in the exposure estimates The assessment implies that the remaining particulates are cleared through mucociliary transport or moved to the oral cavity and swallowed (Cassarett and Doull 1986) If only 85 percent of inhaled particles are deposited in the lungs, the remaining 15 percent must be expectorated or swallowed If a deposition factor is used, then the ingestion intake equation should be revised to reflect the increase in contaminant intake from particulates not deposited in the lungs, but ingested It would be more appropriate, however to eliminate this factor from the reasonable maximum exposure (RME) inhalation equation for all receptors, as was stated by EPA in the April 11, 1995 letter to DOE regarding exposure parameters and in previous discussions between EPA and DOE

Response

Use of chemical-specific matrix effects (MEs) was approved by EPA as an RFETS-specific exposure parameter and will remain in exposure calculations for the Draft Final IM/IRA DD A discussion will be included in the text to outline the rationale for using specific ME values for soils This rationale is conservative in that all ME factors are high based on findings in the literature This conservative approach accounts for different soil types

The respirable fraction (RF) will be eliminated from intake factor equations because this parameter is accounted for in the particulate emission factor (PEF)

The respiratory deposition factor (DF) will be eliminated from exposure calculations in the Draft Final IM/IRA DD as agreed

Comment 2

Mean chemical concentrations in surface water and groundwater were compared to chemical-specific ARARs This is incorrect To be protective of adverse human health effects and allow an adequate margin of safety, the maximum detected concentration should be compared to maximum contaminant levels (MCLs) for groundwater and ambient water quality criteria for surface water unless otherwise required by law The 95th percentile upper confidence limit (95 UCL) or maximum concentration whichever is highest should be used for comparison to risk-based standards.

Response

Mean chemical concentrations, as well as maximum values and 95 percent upper confidence limits on the means (UCL_{95}) will be compared to applicable or relevant and appropriate requirements (ARARs) in the Draft Final IM/IRA DD If the maximum or UCL_{95} is above an ARAR but the mean is not outlier testing and professional judgment will be used to determine PCOCs

The only incorrect water quality standard was for arsenic This will be corrected in the revised document

Comment 3

The focused risk assessment presented in the OU7DD includes a complete evaluation of an open-space scenario The construction work and office worker scenarios however, exclude several potentially complete exposure pathways For example, in addition to groundwater ingestion office workers may be exposed to surface soils through ingestion, inhalation of particulates, and dermal contact Tracer element studies have shown that soil ingestion occurs equally from indoor dust and outdoor soil It has also been shown that chemical concentrations in indoor dust are approximately equal to that in outdoor soil Soil exposure pathways should be evaluated for occupational receptors Inhalation of volatile organic compounds (VOCs) migrating through subflooring by office workers is also a potential exposure pathway that should be considered

For the construction worker scenario exposure to subsurface soil is evaluated Surface soils however must be contacted in order for subsurface contact to occur Therefore, exposure to surface soil through inhalation of particulates ingestion and dermal contact should be included in the evaluation of the construction worker scenario A mixing model can be used to combine surface and subsurface soils Exposure point concentrations for construction workers should be estimated from data aggregated from 0 to 12 feet below ground surface (bgs) In addition dermal contact and ingestion of seep water are complete pathways for construction workers during construction of a drain connecting the leachate seep to the pond These pathways should also be included in the quantitative risk assessment

In the spray evaporation areas, receptors who use the open space are the only potential human receptors considered If occupational development in these areas is possible risks to occupational workers and construction workers should be evaluated If these receptors are not considered reasons for excluding these scenarios should be discussed

Response

Construction worker and office worker exposure scenarios will not be evaluated in the Draft Final IM/IRA DD because these scenarios are not applicable for this area

Inhalation of volatile organic compounds (VOCs) is an incomplete pathway The only potential exposure to VOCs for human receptors is exposure within the landfill because VOCs in leachate/groundwater will remain in the subsurface Landfill gas is contained within the landfill mass by the existing groundwater intercept system Institutional controls including fencing deed restrictions and/or state orders will restrict access and land use However exposure to VOCs was included in the human health risk assessment as a conservative measure to evaluate potential risk to open space receptors from exposure to VOCs in landfill leachate at the seep, surface water and sediments in the pond surface soils in spray evaporation areas and groundwater downgradient of the landfill

The previous use of the office worker scenario in estimating human health risk from exposure to groundwater was inappropriate After the initial OU 7 risks had already been computed a new approach was taken (during IHSS prioritization) to address groundwater contaminant concerns in a more reasonable fashion Under currently expected land uses and agreed upon exposure scenarios there are no exposures to groundwater unless it surfaces in seeps streams or ponds The open space scenario represents the most probable future exposures in the buffer zone Therefore the open space exposure scenario was chosen in order to conservatively estimate potential risks to the public from groundwater For this evaluation, it is assumed that maximum concentrations of chemicals found in groundwater represent the highest potential concentrations to which an open space user might be exposed at a seep or other surface water location For the Draft Final IM/IRA DD therefore groundwater risks will be estimated using the maximum groundwater concentration in the surface water exposure intake equations for the open space receptor The unnamed tributary of Walnut Creek (No Name Gulch) is a losing stream year round (see response to comment 2 for Executive Summary)

Risks to construction workers involved in remediation activities do not need to be evaluated because a site specific health and safety plan in conjunction with the activity hazard analysis would include information about site contaminants and specific procedures for personal protective equipment and monitoring required for construction of the response action

Comment 4

Chemical data from landfill leachate are not validated in this document The appropriate data validator or laboratory personnel should be contacted if it is unclear whether the data have been validated (EPA 1989a) Qualifiers are assigned to data by the laboratory conducting the analyses and the person performing the data validation The B qualifier attached to the data cannot be assumed to represent

chemicals present in laboratory blank samples if the data have not been validated For example, a "B" qualifier attached to organic chemical data by laboratory personnel indicates that the analyte was found in the associated blank as well as in the sample The data validator would then determine whether the chemical concentration in the site sample was above 10 times the blank concentration (and, therefore a detect) or below that level (and, therefore, a nondetect value) Until data are validated, the attached qualifiers cannot be assumed correct

In addition several chemicals were detected infrequently but at concentrations exceeding ARARs These detections were assumed to be outliers and were eliminated from further consideration This should be supported with rationale for assuming that the detect is an outlier

Response

None of the 1990 chemical data are validated Data with "B" qualifiers referenced in the comment are from 1990 The 1990 data were used in the nature and extent of contamination discussion in the Technical Memorandum Revised Work Plan for Operable Unit 7, September 2, 1995, and for comparability the same data set was used for the IM/IRA DD The 1990 data will not be used for the focused human health risk assessments and ARARs comparisons in the Draft Final IM/IRA DD

Approximately 92 percent of the 1991 through 1993 chemical data are validated (subsurface soil 96 percent, biota 100 percent, groundwater 73 percent, sediment 98 percent, soil gas 100 percent, surface soil 88 percent, leachate/surface water 89 percent) Most data used for the Phase I IM/IRA DD were evaluated for data quality (precision, accuracy, representativeness, completeness, and comparability [PARCC]) and usability in the Final Work Plan Technical Memorandum (September 1994) Approximately 67 percent of the total results for surface water, which include leachate, pond water, and groundwater intercept discharge, are valid and fully usable Approximately 18 percent of the total results are estimated results and are fully usable Approximately 9 percent of the total results are unvalidated and were used in the IM/IRA DD Only 6 percent of the total results for surface water were rejected or otherwise determined unusable

Chemicals detected infrequently but at concentrations exceeding ARARs were considered "outliers" in the Draft IM/IRA DD if the chemical was detected in less than 5 percent of the samples collected. Following the procedures outlined in Statistical Comparisons of Site-to-Background Data in Support of RFI/RI Investigations (EG&G 1994), professional judgment was used as the final step in the identification of potential contaminants of concern (PCOCs) Professional judgment follows the statistical comparison steps and includes a review of test results and graphic compilations of the data. The professional judgment of the reviewer is required to consider factors not apparent from the statistical comparisons, such as spatial and temporal distribution of analytes, historic information regarding past site operations inter-element correlations, mass-balance calculations, and knowledge of the hydrology, geochemistry, and geology of the site This final step is used to identify "outliers" or other occurrences that may otherwise be erroneously included in the final COC list

An outlier is defined as "an observation that does not conform to the pattern established by other observations in the data set" (Gilbert 1987) As used in the OU 7 IM/IRA document, this included primarily single detections (temporally non-recurrent or non-reproducible) and spatially isolated occurrences It should also be noted that with large data sets such as these (greater than 50 samples), occasional UTL exceedances are expected because the Upper Tolerance Limits (UTL) value includes only the 99th percentile of the background data Thus, isolated samples may be reflective of the statistical methodology laboratory error or a sampling anomaly The word "anomaly" in the PCOC discussion may be more concise than "outlier"

In the Draft Final IM/IRA DD, the rationale for the elimination of any PCOCs through outlier testing or professional judgment shall be provided

2 2 Ecological Risk Assessment

Comment 1

The ecological risk assessment repeatedly states that the existing seep will be covered by the presumptive remedy and therefore will not be a point of exposure to contaminants for ecological receptors in the future It is not clear however where leachate that currently is released at the seep will go It appears that it may be collected by a drain system and discharged to the East Landfill Pond If this is not the case it is not clear how this would reduce the likelihood of an organism s exposure to the contaminants Although the volume of leachate discharged from the landfill is expected to attenuate over time initial discharges would probably be similar to current volumes but to a smaller receiving body Conditions at the discharge point would therefore be expected to be similar to the current situation and overall pond water quality would be expected to be worse The OU7DD should evaluate the effects of movement of the leachate discharge point rather than assuming burial of the seep will eliminate leachate discharge Ecological risk should be reassessed and all discussions related to discharges of seep and pond waters should be reassessed

Response

Based on agreements between DOE EPA and CDPHE the Draft Final IM/IRA DD will recommend complete removal of the East Landfill Pond Leachate contained in groundwater will remain in the subsurface If necessary leachate will be treated for those contaminants that exceed or will exceed (based on modeling results) ARARs at the Point of Compliance Treated groundwater will be discharged to the subsurface

Under currently expected land uses and agreed upon exposure scenarios there are no exposures to groundwater unless it surfaces in seeps streams or ponds The East Landfill Pond will be removed and the drainage regraded to prevent seeps No Name Gulch is a losing stream year round so groundwater is not expected to surface in the stream In addition future development of groundwater will be prohibited by institutional controls

Comment 2

The OU7DD states that receptors were assumed to use OU7 100 percent of the time in order to develop a conservative estimate of risks At the end of the risk assessment however it was determined that this approach was too conservative and the calculated risk was reduced In order to be a usable tool a risk assessment should reflect the most likely site conditions The revision of basic exposure parameters after the compilation of risk calculations has the appearance of an arbitrary change designed to reduce risk Actual assessment parameters should be defined from the beginning

Response

Exposure parameters were not arbitrarily altered to reduce the level of apparent risk Rather risks associated with the "worst case" scenario were clearly presented and the implications of relaxing conservative assumptions were discussed This includes exposure to water from the seep at SW097 The effect of altering the intensity of site use on exposure and risk was presented for a range of conditions from 0 to 100 percent site use In our experience this approach is more useful in supporting risk management decisions than negotiating a single set of exposure parameters for biological variables that exhibit natural variability providing risk managers with truly arbitrary exposure and risk estimates

As stated in the Introduction to Appendix D the ecological portion of the risk evaluation was intended to be a screening level evaluation of risk from surface water and sediments of the East Landfill Pond The use of conservative assumptions regarding exposure parameters is appropriate when conducting a screening level evaluation (EPA 1994) Conservatism was adopted wherever assumptions were needed so that all

assumptions would tend to bias results in the same direction (EPA 1994) As a result, the qualitative interpretation of the results tended to focus on the potential effects of relaxing the conservatism in assumptions about factors such as site use, bioavailability, or the number of organisms affected

Based on agreements between DOE, EPA, and CDPHE, the Draft Final IM/IRA DD will recommend complete removal of the East Landfill Pond A groundwater collection and treatment system might be installed if contaminants exceed or will exceed (based on modeling results) ARARs at the Point of Compliance at the edge of the Waste Management Unit Under currently expected land uses and agreed-upon exposure scenarios there are no exposures to groundwater unless it surfaces in seeps, streams, or ponds The unnamed tributary of Walnut Creek (No Name Gulch) is a losing stream year-round (see response to comment 2 for Executive Summary) As a result, the exposure points addressed in the comment will be removed and, therefore the exposure pathways eliminated.

Comment 3

All identified uncertainties relate to overestimation of ecological risk Others are noticeably absent such as the lack of organism-specific or chemical-specific toxicity information All types of potential uncertainties should be identified rather than just those resulting in overestimated risk.

Response

See response to comment 2 for Ecological Risk Assessment

Comment 4

It appears that potential chemicals of concern (PCOCs) were eliminated from further consideration if no ecological effects information have been developed for them The rationale to support this approach should be provided The conservative standard procedure is to retain PCOCs for which there are no effects data

Response

If no ecological effects information has been developed for a PCOC, there is no meaningful way to assess the risk from that compound For this reason PCOCs without ecological effects information were omitted from further consideration

Comment 5

The development of a no observed adverse effects level (NOAEL) cannot be based on a single study that tested a single dose of concentration that resulted in an observed effect. One observation does not allow distinction of a range of effects The analyses of NOAELs should be re-evaluated.

Response

Although the author does not specify, this comment apparently refers to the benchmarks for toxicity of di-(N) butyl phthalate and bis(2-ethylhexyl) phthalate to mallards (Section D3 2 3 1, page 15 last bullet on the page) The reviewer's statement that a formal NOAEL cannot be derived from a single dose is accurate However the reviewer is probably aware that formally derived toxicity constants are often not available for a specific chemical/species combination All of the benchmarks used in the document were derived from toxicological literature according to a review procedure designed by DOE contractors at Oak Ridge National Laboratory The benchmarks for the phthalates were taken directly from their database As noted in the text, the benchmarks are derived to approximate the NOAEL. The process for deriving benchmarks has been approved by EPA Region VIII ecotoxicologists for use in screening-level risk assessments at RFETS

Comment 6

Throughout the OU7DD the need to mitigate the loss of wetlands during the construction of the landfill is identified with the potential for use of wetlands banked during construction of the Standley Lake diversion project to compensate for the lost wetlands It is not clear that wetlands will be created beyond those required to mitigate wetland losses from construction of that project More specificity should be provided regarding the potential loss of wetlands during construction of the landfill cap

Response

The wetland bank program is awaiting approval by EPA Text describing the potential loss of wetlands will be added

Comment 7

Much of the ecological risk assessment is based on incorrect water quality standards and the assumption that covering the seep will eliminate the release of leachate These factors underestimate the ecological risk associated with OU7 Ecological risk should be reassessed for all media receptors and PCOCs

Response

A review of the current state water quality standards revealed that only the value for arsenic was incorrect The evaluation will be revised using the correct arsenic value Stream segment specific state water quality standards for radionuclides were developed for protection of human health and are not applicable to aquatic life Therefore benchmarks developed specifically for RFETS by scientists at Argonne National Laboratory and Oregon State University were used to evaluate the potential for toxic exposure of aquatic life

See response to comment 2 for Ecological Risk Assessment

Comment 8

Risk to aquatic life in the East Landfill Pond appears to be minimal based on toxicity studies and the presence of organisms that are moderately tolerant of pollution However the species list is not very diverse and is largely composed of species that are highly tolerant of polluted environments The basis for determination of tolerance should be explained including whether it is related to sewage related compounds or metals and nonsewage organic compounds Tolerance of an organism to pollutants is not consistent across the range of pollutants Rationale should be provided regarding the apparent paucity of species in a 20 year old pond with an apparently consistent water supply

Response

Sediment toxicity tests indicate no toxicity to Hyallela azteca This is a largely epibenthic species which spends much of its time grazing on the sediment surface As noted in the text toxicity tests using a burrowing species (Chironomus tentans) failed due to loss of laboratory cultures The preliminary evaluation of sediment data indicates concentrations of organic chemicals (especially polyaromatic hydrocarbons [PAHs]) that may be toxic to benthic in fauna and may limit the benthic community to moderately and highly tolerant species

As noted previously the recommended alternative in the Draft Final IM/IRA DD will include elimination of the East Landfill Pond Therefore the potential limitations on the aquatic community due to sediment contaminants in the East Landfill Pond are not an issue

Comment 9

Ecological effects of contaminated surface and subsoils were not evaluated. The effects of contaminants on plants and burrowing animals should be evaluated

Response

The revised IM/IRA DD will evaluate ecological effects of contaminated surface and subsurface soils.

Comment 10

The process used to identify PCOCs is not described beyond saying a standard set of criteria, including professional judgment were used Rationale should be provided for eliminating contaminants

Response

See response to comment 4 for Ecological Risk The exposure and risk screens described in Appendix D were conducted for all PCOCs identified for surface water and sediments Selection of PCOCs was not conducted as part of the ERA The methodology for identifying PCOCs is specified in Section 2 5 1 Metals, radionuclides and indicator parameters having elevated concentrations relative to background, as indicated by any one of the inferential statistical tests or the hot-measurement test, were identified as PCOCs Organic compounds were considered PCOCs if detected in samples from OU 7 No PCOCs were eliminated before the performance of the ERA

2 3 Landfill Design

Comment 1

The OU7DD evaluates three cover systems to cap the OU7 landfill The only difference among the three alternatives is the design of the low-permeability layer(s) All three alternatives include a flexible membrane cover (FMC) Underlying the FMC, Alternative 5 includes soil bedding material, Alternative 7 includes 12 inches of low-permeability (1E-05 centimeters per second [cm/sec]) soil and Alternative 9 includes 24 inches of clay (1E-07 cm/sec) According to the document, Alternative 7 is the recommended alternative Compared to Alternative 9 Alternative 7 has greater long-term effectiveness, is easier to implement has lower costs, and has greater short-term effectiveness The conclusion that Alternative 7 has greater long-term effectiveness should be further supported for several reasons The reasons are enumerated below

- According to the report Alternative 7 has greater long-term effectiveness because the clay layer in Alternative 9 is subject to desiccation cracking and is therefore more prone to leakage if the FMC ruptures The report states that covers constructed with clay materials at high moisture contents may be subject to more desiccation than covers constructed of soil materials at a lower moisture content. This statement requires further rational, as it contradicts landfill closure regulations, standard accepted practices, and EPA guidance (EPA 1985 1989b, 1991b) Furthermore, if water is percolating through a ruptured FMC it seems that any underlying desiccated clay will dehydrate and function as intended

  Response

  In general factors that influence clay layer desiccation include the clay mineralogy, plasticity, sand content initial moisture content temperature variations nature of the clay's contact with overlying geomembrane or underlying surface and overburden pressures These factors have been investigated by several researchers and it has been suggested that a clay layer having a lower swelling potential,

lower plasticity index lower initial moisture content and a thicker vegetative soil cover which provides sufficient temperature insulation and overburden pressure to maintain a tight contact between the clay and the overlying geomembrane will be less likely to desiccate than a clay layer that does not have these characteristics

The low permeability soil layer proposed for Alternative 7 is intended to incorporate many of the factors identified above to reduce the potential for clay desiccation compared to the clay layer proposed in Alternative 9

Clay healing generally applies to clay liner systems that will be subjected to high overburden pressures from overlying waste fills In cases of very large landfills the clay can be become highly compressed causing a redistribution of the clay to close cracks and voids These high overburden pressures are typically not present in cover systems

The ability of a clay to rehydrate after cracking is very dependent on the characteristic of the clay A pure bentonitic clay such as GCL will hydrate and achieve a permeability similar to a pre-drying condition however normal compacted clay covers would not have the potential to totally rehydrate and achieve a permeability equal to the pre-drying permeability

- According to EPA guidance (1989b) a dual component barrier system is desirable because the layers complement each other The FMC will tend to roof over the inconsistencies in the underlying compacted soils while the compacted soil will tend to significantly impede the flow of any leakage through a hole in the overlying FMC (EPA 1989b) In addition, placing an FMC above a moist clay layer tends to protect the clay from desiccation Finally each component tends to back up the other in the event of a failure of either component (EPA 1989b) If there is leakage through a hole in the FMC or if the FMC significantly ruptures 24 inches of clay with a hydraulic conductivity of 1E 07 cm/sec (Alternative 9) will be more effective than a 12 inch soil layer with a hydraulic conductivity 100 times larger (Alternative 7) The Hydrologic Evaluation of Landfill Performance (HELP) model should be rerun to determine how well the two soil layers "back up" the FMC in the event of failure or slight leakage

Response

We concur with the EPA guidance documents that recommended a dual-component barrier system A composite system is the basis for the proposed Alternative (Alternative 7) which includes an FMC over a low permeability soil However we are concerned that in the long run a highly plastic high moisture content clay (Alternative 9) will eventually dry and crack The cracks will form soil irregularities and stress concentrations in the FMC that may result in defects in the FMC Holes in the FMC directly above desiccation cracks may result in infiltrating water having a direct conduit to the waste Although this cannot be accurately modeled this condition is considered to be worse than an intact FMC overlying a low permeability soil ($1x10^{-5}$ cm/sec) that is not cracked

The HELP analyses that were conducted in support of the selection of Alternative 7 evaluated the impacts of expected defects in the FMC for both Alternatives 7 and 9 Recommended defect rates were included in the HELP analyses for both alternatives and the results indicated leakage rates of 1 $6x10^{-4}$ inches (average annual totals) for Alternative 7 and $1x10^{-5}$ inches for Alternative 9 This corresponds to 0 001 percent of rainfall for Alternative 7 and 0 00007 of rainfall for Alternative 9 This is not considered to be a large difference

We concur that if a large defect occurs in the FMC that a 1 $x10^{-5}$ cm/sec clay will allow considerably more water to infiltrate than a 1 x 10^{-7} cm/sec clay However large defects or ruptures in the cover should not occur if a proper construction quality assurance (CQA) program (as recommended by the EPA) is

implemented during construction Large defects and/or ruptures that may occur after construction should be observable from the surface during normal inspections and could be repaired.

- Landfill closure regulations typically require final covers to have hydraulic conductivities less than or equal to the hydraulic conductivity of the underlying soils. The OU7DD assumes the hydraulic conductivity of the weathered bedrock below the landfill to be approximately 1E-07 cm/sec. If there is leakage through a hole in the FMC or if the FMC significantly ruptures, the 12- inch soil layer's hydraulic conductivity of 1E-05 cm/sec is not less than the underlying soils, as required. Therefore, leakage into the landfill could exceed seepage out, resulting in the "bathtub" effect. This effect is undesirable because waste can become saturated and produce highly concentrated leachate In addition leachate hydraulic heads will increase within the landfill, which can increase leakage rates out

Response

In comparing the permeability of the cover system with the permeability of the subsurface, we have utilized the permeability values for the subsurface that were based on field scale tests and the composite permeability of the FMC and the low-permeability soil We do not believe that it is appropriate to compare the permeability of the low-permeability soil directly below a small defect (1 cm in diameter considered typical for a good CQA program) and the field-scale permeability values As stated above large ruptures during construction should be located and repaired as part of the CQA program Large ruptures after construction should be noted during regular inspections and could be repaired

Furthermore, if it was possible to sample and test the subgrade soils at a scale on the order of 1 cm diameter, it is suspected that measured permeability values could be much higher (in the range of 10^{-5} cm/sec) and much lower (in the range of 10^{-9} cm/sec) than the 1×10^{-7} cm/sec value Therefore, in either case the cover permeability is considered less than or equal to the subsurface permeability when they are evaluated at comparable scales

- FMC rupture could be caused by differential settlement Any differential settlement will also affect the soil layer below Alternative 9 may be less susceptible to settlement effects as compared to Alternative 7 The compacted clay component can deform somewhat more without rupturing because it is thicker and because clay has "self healing" properties as a result of the clay's shrink and swell characteristics The text states that the potential for differential settlement is limited. However, the landfill is generating gases and decomposing Therefore, settlement is likely to occur following cap construction The advantages of the self-healing properties of clay and the potential for differential settlement have not been given adequate consideration in the IM/IRA.

Response

We concur that differential settlement can occur at the OU 7 landfill as a result of waste settlement However the grading plan for the landfill requires the placement of up to 15 feet of fill to achieve surface water drainage This fill will be placed prior to cover construction and will act to minimize localized differential settlement Only long-term regional settlements will put the liner components into compression, minimizing the potential for cracking

The self healing aspects of a clay layer are discussed above

Comment 2

Based on the above comments, it may be useful to consider an alternative that uses a 12-inch layer of clay beneath the FMC This alternative will be less costly than Alternative 9, easier to implement have

greater short term effectiveness and still provide all the advantages associated with constructing the barrier layer with low permeability clay

Response

A reduction of the clay layer thickness from 24 inches to 12 inches only intensifies the clay desiccation issue in that a 12 inch thick clay layer will be more sensitive to changes in permeability due to desiccation than a 24 inch thick clay layer See response to comment 1 for Landfill Design bullets 1 and 2 above

Comment 3

It is not clear why the evaluated alternatives do not include a biotic barrier in the cap A biotic barrier protects the integrity of the low permeability layer by preventing burrowing animals and plant roots from puncturing the layer A biotic barrier also prevents plant and animals from being exposed to landfill contents The text does state that the 36 inch vegetation layer will prevent burrowing animals from reaching the low permeability layer but it is not clear how this layer will achieve these results The text should support the conclusions regarding burrowing animals and plant root depths, or else provide a biotic barrier in the caps

A review of site specific biologic conditions at OU 7 indicates that a biotic barrier is necessary

Comment 4

Alternative 9 includes a gas collection layer directly below the clay layer This configuration may result in desiccation of the clay layer The Alternative 9 design should consider a layer placed above the gas vent to prevent gases from desiccating the overlying clay

Response

The gas-collection layers shown in Alternative 7 and Alternative 9 are both located below the soil barrier component of the cap This is an EPA recommended standard design feature Additionally it is believed that the gas emitted from the waste will have a high moisture content and will not significantly promote desiccation in either design

Comment 5

The three capping alternatives include a 36 inch vegetation layer The rationale for the 36 inch thickness should be provided The thickness should be based on factors such as frost depth evaporative zone depth expected burrow depth and expected plant root depth

Response

The dimensions given on the cover alternatives are preliminary Further refinement of the design layer thickness will occur during the final design effort where issues such as frost burial depth evaporative zone depth burrowing animal depth and plant root depth will specifically be addressed

Comment 6

The report states that no action alternative will not meet chemical specific ARARs because leachate at the seep exceeds four Colorado water quality (CWQ) standards one MCL and two practical quantitation limits (PQLs) For the two capping alternatives the only chemical specific ARAR exceedances mentioned are associated with surface water (one CWQ standard) and groundwater (one MCL, one CWQ and one PQL) The leachate exceedances are not discussed Presumably under the capping alternatives the blanket drain will discharge leachate at the pond or at some other downgradient location Therefore

exceedances in ARARs may occur at the seep discharge location under Alternatives 7 and 9 The IM/IRA should address this potential noncompliance with ARARs

Response

Based on agreements between DOE, EPA and CDPHE, the Draft Final IM/IRA DD will recommend complete removal of the East Landfill Pond Leachate contained-in groundwater will remain in the subsurface If necessary, leachate might be treated for those contaminants that exceed or will exceed (based on modeling results) ARARs at the Point of Compliance Treated groundwater will be discharged to the subsurface

Under currently expected land uses and agreed-upon exposure scenarios, there are no exposures to groundwater unless it surfaces in seeps, streams, or ponds The East Landfill Pond will be removed and the drainage regraded to prevent seeps No Name Gulch is a losing stream year-round, so groundwater is not expected to surface in the stream (see response to comment 2 for Executive Summary) In addition, future development of groundwater will be prohibited by institutional controls

Groundwater Modeling

Comment 1

The groundwater intercept system is not correctly represented in the MODFLOW groundwater flow model The text states, and Figure C-1 shows, the groundwater intercept system is represented by drain cells which surround the northern, western, and southern sides of the landfill The drain cell requires that the user specify a drain elevation (which does not have to coincide with the bottom of the cell) and a conductance The drain cell withdraws water from the model at a rate determined by the drain conductance and difference between the head in the cell and the drain elevation, but only when the head in the cell exceeds the drain elevation Figure C-1 shows, however, a gap in this boundary corresponding to the section of the intercept system that is believed to be ineffective. A previous document (DOE 1994) included a detailed evaluation of the effectiveness of the groundwater intercept system and concluded that the system did not function properly on the northern side of the landfill because the drain was not keyed into the bedrock, allowing water to flow underneath the drain and into the landfill Therefore, the groundwater model would represent the groundwater system more accurately if a continuous boundary of drain cells surrounded the landfill area on the north, west, and south sides Groundwater could still bypass the intercept system on the north side where the drain cell elevations are greater than the elevations of the bottoms of layer 1 drain cells This configuration should provide a more accurate estimate of groundwater that enters the landfill from the north Correctly representing this boundary condition should affect model calibration and require the model to be recalibrated.

Response

In the Draft IM/IRA DD model configuration, some drain cells were removed on the north side of the landfill and the remaining drain cells on the north side were reduced in conductance from the values used for the south side drain cells (see Table C-1) This configuration is correct if the groundwater intercept system is partially to fully blocked on the north side The potential for blockage exists from construction activities associated with the tie-in of the small slurry wall on the north side of the landfill Other possible causes of blockage include activities during the construction of the intercept system and silting in of the drainage layer

Whether the north drain is functioning is uncertain Modeling of the drain as described in the comment has been performed The fit of simulated heads to measured heads is acceptable, but not as good as the fit presented in Appendix C (as measured by residual sum of squares) Because the fit is acceptable and the blockage of the north drain has not been proven the modeling will be performed as suggested in the comment

Comment 2

Calibration of the model is inadequate because the modeled seep flow at the beginning of the no action scenario simulation (1 88 gpm) is one half of the average observed seep flow (3 61 gpm) that was presented in the Modified Final Proposed Action Memorandum for Passive Seep Collection and Treatment at Operable Unit No 7 (Kaiser Hill 1995) Section C 6 of the text does not indicate that seep flow rate was included as a calibration target It is generally recommended to use estimates of flow as calibration values in addition to heads in order to increase the likelihood of achieving a unique calibration (Anderson and Woessner 1992) This is particularly critical when the model is used to predict changes in flow rates in response to changes in the flow system as is the case with this model Therefore the model should include the average seep flow as a calibration target The model should also be recalibrated to achieve a better match between predicted and observed flow rates under the no action scenario

Response

The comment asserts that the groundwater flow model should be calibrated to the average flow at the seep This assertion is incorrect the groundwater flow model is calibrated not to "average" conditions but to the conditions at one specific time March 1993

The seep flow measurements as reported have a high margin of error All measurements of the seep flow with one exception are visual estimates only Accurate flow measurement is difficult if not impossible because the seep location contains landfill debris weeds and multiple seepage points Estimates made during multiple site visits during 1994 and 1995 ranged from 1 gpm to 5 gpm with the majority of the estimates being between 1 and 2 gpm During an extremely wet period in April 1995 flows were estimated at 5 gpm

Well hydrographs in the landfill vicinity show that high water elevations occur in the spring, usually in April These increased flows are due to increased infiltration following spring precipitation events Elevations before and after the peak fluctuate rapidly and low to moderate flow conditions exist during the majority of the year The model is calibrated to water elevations measured in March 1993 which more closely represent low to moderate flow conditions during the majority of the year rather than to the high flow condition which occurs for only a short time period

In summary the seep flow was used in the calibration of the model The model was calibrated using well head elevations and the reasonableness of the simulated flow at the seep was used as a check Adjustments to hydraulic conductivities and recharge were made during the calibration to adjust the simulated flow at the seep A simulated flow of 1 88 gpm is reasonable for March 1993 flow conditions

2 5 Applicable, Relevant or Appropriate Comments

Comment 1

Discussions regarding ARARs will require revision when other sections are revised

Response

Descriptions of ARARs throughout the report will be revised as necessary

Comment 2

Responsibility for determining compliance with the substantive requirements for permits is not clear DOE does not discuss interactions with responsible agencies The determining agency should be specified for all actions that will provide substantive efforts in lieu of formal administrative requirements

Response

OU 7 remediation and closure activities will be conducted in accordance with the Interagency Agreement (IAG) Part 18 of the IAG states that response actions conducted entirely on site are exempted from the procedural requirements to obtain permits. However, these actions must satisfy applicable or relevant and appropriate federal and state standards, requirements criteria, or limitations that would have been included in such permits Under the IAG, CDPHE administrative requirements are not applicable in CERCLA actions

3 0 Specific Comments

Comment 1

Executive Summary The Executive Summary states that the presumptive remedy of containment addresses all potential pathways except surface water and sediment in the East Landfill Pond and surface soils in the spray evaporation areas However, the presumptive remedy also does not address pathways associated with existing groundwater contamination outside landfill boundaries Therefore, the document should clarify whether or not groundwater will be addressed along with surface water, sediment, and surface soils if appropriate

Response

The executive summary will be clarified Groundwater downgradient of the source area will be addressed along with surface water sediment, and surface soils in the revised document

Comment 2

Page 7-2 Third Paragraph This paragraph states that the landfill cap will cover the existing leachate seep thereby eliminating exposure to the seep The text then states that a gravel blanket will drain seep water so the water will not build up and create a seep onto the new cap It is not clear whether this gravel drainage blanket will daylight or where it will discharge This location should be clarified. Exposure pathways could exist at the point of gravel drain discharge

Response

Leachate contained-in groundwater will remain in the subsurface If necessary, leachate might be treated for those contaminants that exceed or will exceed (based on modeling results) ARARs at the Point of Compliance Treated groundwater will be discharged to the subsurface

Under currently expected land uses and agreed-upon exposure scenarios there are no exposures to groundwater unless it surfaces in seeps streams, or ponds The East Landfill Pond will be removed and the drainage regraded to prevent seeps No Name Gulch is a losing stream year-round, (see response to comment 2 for Executive Summary) so groundwater is not expected to surface in the stream In addition, future development of groundwater will be prohibited by institutional controls

Comment 3

Section 3 Page 3 3, 3rd paragraph This paragraph discusses the potential exposure pathways associated with OU7 It is unclear whether "ingestion and dermal contact with waste materials" includes direct contact with chemicals or dermal contact with contaminated soil The text should be revised to clarify whether both pathways will be evaluated

Response

The text will be revised to clarify that the exposure pathways are ingestion and dermal contact with contaminated soil

Comment 4

Section 3 3 6 Page 3 9 This section concludes that the preliminary remediation goal (PRG) screen conducted on three East Landfill Pond sediment samples indicated that all 20 of the identified PCOCs for the East Landfill Pond sediments were found not to exceed the PRGs for an open space user and therefore, there is no risk to human health from the East Landfill Pond sediments The final work plan for OU7 (DOE 1994) detailed the seven step data quality objective (DQO) process that has guided decisions on data collection at OU7 The outcome of the DQO analysis concluded that 400 additional sediment samples would be needed to determine whether five of the PCOCs identified for East Landfill Pond sediments exceed PRGs However the decision was made not to collect these 400 sediment samples The text explains that "for these five PCOCs the sample means exceeded the guidance or recommendation to be considered (TBC) or PRG by a least one order of magnitude Given the magnitude of these exceedances it is not likely that additional data will affect the decision to remediate these sediments The text also states "the available data already strongly support a decision to take remedial actions " Therefore according to the seven step DQO decision making tool developed by DOE for OU7, 400 additional sediment samples still need to be collected in order to determine whether PCOCs for the East Landfill Pond exceed PRGs The text should be revised accordingly

Response

Open space PRGs were used for the PRG screen in this report in accordance with recommendations from the Future Land Use Working Group (DOE 1995) None of the PCOCs for pond sediments exceeded open space PRGs Residential PRGs were used in the PRG screen performed as part of the DQO analysis in a draft version of the OU 7 Work Plan Five PCOCs exceeded residential PRGs Because the recommended future land use is open space the PRG screen performed for this report is adequate to characterize the risk to human health from East Landfill Pond sediments

The recommended alternative in the Draft Final IM/IRA DD will include complete elimination of the East Landfill Pond and moving sediments under the landfill cap Therefore any potential risk from the pond sediments will be eliminated

Comment 5

Section 3 Page 3 35 Table 3 6 Although the reference for the particulate emission factor (PEF) value correctly cited as "EPA Guidance for Superfund Volume I Human Health Evaluation Manual, Part B (1991) " the PEF value as listed in Table 3 6 is incorrect A PEF of 4 63E9 cubic meters per kilogram (m^3/kg) is the default value provided in EPA guidance (1991a) and should be used in the calculation of particulate inhalation of surface soil The table currently lists a value of 4 63E10 m^3/kg

Response

The value for the particulate emission factor (PEF) in Table 3 6 will be corrected to 4 63E9 m^3/kg the default value provided in EPA Guidance for Superfund Volume I Human Health Evaluation Manual Part B (1991)

Comment 6

Section 3 Figure 3 8 The conceptual site model for surface soils in spray evaporation areas should be revised to include office workers and construction workers who may also be exposed to surface soils through ingestion dermal contact external radiation or inhalation of particulates If construction or

industrial activities could occur in these areas then it is necessary to evaluate exposure via these pathways

Response

The conceptual site model for surface soils in spray evaporation areas will not be revised to include office and construction workers Exposure pathways for these scenarios are inappropriate because neither construction nor industrial activities will occur in these areas

Comment 7

Section 3 Figure 3-6 The conceptual site model for landfill leachate at the seep should be revised to include construction workers who may also be exposed to seep water through dermal contact and ingestion during construction of a drain connecting leachate seep to the pond If this activity is expected to occur, then it is necessary to quantitatively evaluate exposure via these pathways

Response

The conceptual site model for landfill leachate at the seep will not be revised to include construction workers involved in remediation activities because exposures from remediation activities would be precluded by site-specific health and safety requirements for personal protective equipment and monitoring.

Comment 8

Page 3 34 Table 3-5 Table 3 5 presents the site-specific exposure parameters for assessing risks to open-space users from soil ingestion The values listed are acceptable for estimating intakes from nonradiological analytes but are not appropriate for radionuclide risk estimates Specifically the soil ingestion rate for this receptor should be age- and weight-adjusted when used in radionuclide risk estimates As stated in EPA guidance (1991a), soil ingestion rates differ for children and adults, therefore, age-adjusted ingestion rate factors are used in the soil pathway equation when assessing risks from radionuclide exposure The soil ingestion rate must be adjusted because the radionuclide intake equation does not include body weight or averaging time, which are important when considering the difference in soil ingestion rates between adults and children Children ingest more soil and weigh less than adults, but the increased soil ingestion rate is assumed to occur for only 6 years EPA guidance (1991a) presents an equation for calculating the adjusted soil ingestion rate, it should be used for estimating the soil ingestion rate of open-space users at OU7 for the radionuclide risk assessment

Response

The soil ingestion rate for carcinogenic risk estimates will be age-averaged in the Draft Final IM/IRA DD

Comment 9

Page 7-2 Paragraph 2 The text implies that leachate exposure pathways will be interrupted by capping the landfill and providing a gravel blanket or French drain beneath the landfill to prevent leachate from building up beneath the landfill The text does not specify where the gravel blanket or French drain will terminate, but suggests that it will discharge to groundwater and "the groundwater pathway is already incomplete " Because of the landfill's topographic position above the East Landfill Pond, leachate may still discharge to surface water in the East Landfill Pond thereby allowing continued contamination of the east landfill pond and surrounding sediments The discharge point for the French drain should be specified

Response

See response to comment 2 for Executive Summary

Comment 10

Page 7 4 Paragraph 1 The text states that cap will be graded in such a way as to force surface water to the perimeter of the landfill where it will accumulate in a surface water collection ditch and routed around the East Landfill Pond Figures 7 3 and 7 5 show that the eastern face of the landfill will consist of two relatively steep slopes (20 percent) that slope toward each other forming a valley in which a large volume of landfill runoff may collect

The figures do not depict any structures or ditches that would prevent this flow from entering the East Landfill Pond Because the pond is in direct contact with the landfill this would increase the saturation of the landfill mass Measures to stabilize erosion from the steep eastern slopes and to divert runoff from the pond should be discussed in the text

Response

The recommended alternative for the Draft Final IM/IRA DD will include complete elimination of the East Landfill Pond Erosion control measures along the steeper eastern slopes of the landfill will be considered during the Title II design effort when slope angles in this area are finalized

Comment 11

Page C 5 Paragraph 4 The text states that the model generated potentiometric map supports the conclusion that the groundwater intercept system is failing on the northern side of the landfill The groundwater intercept system was not correctly modeled on the northern side and was, in fact, left out of the model Therefore the model should not be cited to support this conclusion

Response

In the model configuration presented in the Draft IM/IRA DD some drain cells were removed on the north side of the landfill and the remaining drain cells on the north side were input with lower conductance values than the conductance values used for the south side drain cells (see Table C-1) This configuration is correct if the groundwater intercept system is partially to fully blocked on the north side The potential for blockage exists from construction activities associated with the tie in of the small slurry wall on the north side of the landfill Other possible causes of blockage include activities during the construction of the intercept system and silting in of the drainage layer

Whether the north drain is functioning is uncertain Modeling of the drain as described in the comment has been performed The fit of simulated heads to measured heads is acceptable but not as good as the fit presented in Appendix C (as measured by residual sum of squares) Because the fit is acceptable and the blockage of the north drain has not been proven the model configuration in the Draft Final IM/IRA DD will include drain cells as suggested by the reviewer

Comment 12

Page 3 15 Paragraph 1 The text asserts that ARARs are used to create a framework for determining the health and risk based limits for remedial actions and to develop remedial alternatives This statement is incorrect The human health and ecological risk assessments create the framework for determining health and risk based limits and the resulting values may not be the same as ARARs The text should be revised

Response

The text will be revised accordingly

Comment 13

Page 3-19 Section 3 4 2 1 This section states that minimization of the destruction, loss or degradation of wetlands is required by Title 40 of the Code Federal Regulations (CFR) § 6.302(a) This section of regulations however, pertains specifically to implementing Council of Environmental Quality regulations relative to the National Environmental Policy Act (NEPA) which is not pertinent to the discussion as cited Loss of wetlands is governed by the Clean Water Act (CEWA) § 404 and the associated Corps of Engineers and EPA regulations, Executive Order 11990, and 10 CFR 1022 The text should be corrected

Response

The text will be corrected

Comment 14

Pages 3-23 and 3-24 Section 3 4 3 3 DOE proposed to delist the leachate from the landfill as a hazardous waste Several problems have been identified relative to this proposal The assumption that covering the seep with the landfill cap will remove the leachate source is not realistic because the preliminary design discussions indicate leachate will be collected in a drain for discharge to the East Landfill Pond Although the flow of leachate is expected to attenuate to a steady rate over 10 years it would be expected that initial flows would be similar to those currently observed Current water quality at the seep exceeds CWQ standards for several constituents Constituents should not be considered absent above maximum allowed concentrations (MACs) when the analytical detection limits exceed the MACs DOE asserts that only the substantive requirements of 40 CFR 260 20 and 260.22 must be met for the leachate to be delisted However, it falls under EPA's jurisdiction to determine whether those substantive requirements are met not DOE. The text should be corrected

Response

See response to comment 2 for Executive Summary

4 0 References

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U S Department of Energy 1994 Final Work Plan Technical Memorandum for Operable Unit No 7 - Present Landfill (IHSS 114) and Inactive Hazardous Waste Storage Area (IHSS 203) U S Department of Energy Rocky Flats Site Golden Colorado

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EPA 1991b Conducting Remedial Investigations/Feasibility Studies for CERCLA Municipal Landfill Sites EPA/540/P 91/001 OSWER Directive 9355 3 11 February

EPA 1993 Presumptive Remedy for CERCLA Municipal Landfill Sites U S Environmental Protection Agency Office of Solid Waste and Emergency Response Directive No 9355 0 49FS September

Colorado Department of Public Health and Environment
Hazardous Materials and Waste Management Division
Comments on Draft Phase I IM/IRA Decision Document for Operable Unit 7
August 24, 1995

Comment 1

Section 1 3 (Page 1 4) Returning investigation derived materials to the present landfill has been approved by the Division and EPA This action should be mentioned in this document either in this section or elsewhere

Response

Returning investigation derived material from the Phase I and supplemental field investigations to the landfill before closure will be mentioned in the Draft Final IM/IRA DD

Comment 2

Section 2 1 1 (Page 2 2) The specific solvents and degreasing agents that were disposed in the landfill should be identified along with any associated hazardous waste codes The Work Plan mentions "97 solid waste streams that contained hazardous waste or hazardous constituents "

Response

Historical waste disposal records are not specific enough to identify the types of spent solvents and degreasing agents that were disposed None of the wastes disposed were recorded as "listed" hazardous wastes Appendix A of the Final Work Plan Technical Memorandum (DOE 1994) contains available information on hazardous and nonhazardous waste streams disposed from 1968 to 1986 Appendix A is reproduced here as Attachment 1

Comment 3

Section 2 5 3 (Page 2 26) Methylene chloride in the leachate samples was detected at nearly twice the rate as in background samples and the maximum detection was five times the maximum background detection These data do not support the contention that these detections are due only to laboratory contamination

Response

For the Draft Final IM/IRA DD site data from 1990 will be omitted because these data are not validated At the seep methylene chloride is detected in 4 of 11 samples or 36 percent of the samples The maximum detection is 6 µg/L Methylene chloride was detected in 26 of 100 samples, or 26 percent in the background data set The maximum detection in the background data set is 31 µg/L with 5 detections equaling 20 µg/L or greater This data comparison supports the contention that methylene chloride detected at the seep is a laboratory contaminant

Comment 4

Section 2 5 4 (Page 2 27) The sentence that begins at the top of this page is unclear and may need to be re written

Response

The sentence has been rewritten The sentence now reads "Analytes that were detected at concentrations above background include metals and radionuclides VOCs and SVOCs were also detected however none of the VOCs and SVOCs were detected frequently "

Comment 5

Table 2-2 (Page 2 34) The units on this page of the table should be µg/L.

Response

The typographical error will be corrected

Comment 6

Section 3 3 1 (Page 3-4) All regulatory references should be to the appropriate section of the Colorado Hazardous Waste Regulations (6 CCR 1007-) References to Subpart C wastes do not apply to F039 leachate and should be deleted

It is more correct to state that leachate exists by application of the regulatory definition of leachate (6 CCR 1007 3 §260 10 and §261 31), it is not merely determined by the "derived from" rule

Response

All regulatory references will be changed to the appropriate section of the Colorado Hazardous Waste Regulations References to Subpart C waste will be deleted

The text will be revised

Comment 7

Section 3 3 1 (Page 3-5) Ingestion by future onsite workers is the only pathway which evaluates groundwater It has been demonstrated that ingestion of contaminants in groundwater contributes only about a third of the total risk, and inhalation of VOCs from non-ingestion and non-showering uses each contribute approximately one third of the total risk from exposure to groundwater during domestic water use (Supplemental Guidance to RAGS Region IV Bulletin, "Exposure to VOCs during Domestic Water Use Contributions from Ingestion, Showering, and Other Uses") Therefore, DOE's limitation of the calculations to a single pathway may significantly underestimate the risk from groundwater exposure In addition, DOE also did not calculate the possible exposure to contaminated basement air resulting from infiltration of groundwater VOCs through basement walls Therefore, risk is also underestimated because of the omission of this pathway

Response

The previous use of the office worker scenario in estimating human health risk from exposure to groundwater was inappropriate Institutional controls will prevent groundwater from being used by office workers After the initial OU 7 risks had already been computed, a new approach was taken (during IHSS prioritization) to address groundwater contaminant concerns in a more reasonable fashion Under currently expected land uses and exposure scenarios agreed upon by the Future Land Use Working Group (DOE 1995) there are no exposures to groundwater unless it surfaces in seeps, streams, or ponds The open-space scenario represents the most probable future exposures in the buffer zone Therefore the open-space exposure scenario was chosen in order to conservatively estimate potential

risks to the public from groundwater For this evaluation it is assumed that maximum concentrations of chemicals found in groundwater represent the highest potential concentrations to which an open-space user might be exposed at a seep or other surface water location For the Draft Final IM/IRA DD therefore groundwater risks will be estimated using the maximum groundwater concentration in the surface water exposure intake equations for the open space receptor

The unnamed tributary of Walnut Creek (No Name Gulch) is a losing stream year round based on the following three facts

1 *A search of RFEDS for the four surface water stations below the landfill pond on No Name Gulch (SW014 SW111, SW110 and SW015 from west to east) yields either no flow information or dry conditions Conversations with field personnel who sampled No Name Gulch during storm events confirm that no observable surface water flow exists*

2 *Based on a detailed study of Woman Creek's surface water/groundwater interaction, the location and subsurface geomorphology of No Name Gulch indicates the stream is a losing reach In the Woman Creek study the only reaches that either gained year-round or seasonally were located at the western portion of RFETS buffer zone and were adjacent to large pediments containing substantial subsurface flows The few isolated gaining reaches that do not meet the above criteria are fed by localized seeps and are spatially quite small A field survey indicates no substantial seeps flowing into No Name Gulch below the current landfill pond*

3 *Two fully dynamic surface water flow models (including the EPA model Hydrologic Simulation Program Fortran) have also been developed for the Walnut and Woman Creek basins In some of the pervious land segments of these models subsurface and/or surface seep flow time series were required to be added to pervious land segments to calibrate the stream hydrographs This addition of water to a basin indicates a substantial interaction of the reach with groundwater No external flow time series were required to be added to the pervious land basin containing No Name Gulch By inference this tends to support the conclusion that No Name Gulch is a losing reach*

Inhalation of VOCs is an incomplete pathway The only potential exposure to VOCs for human receptors is exposure within the landfill because VOCs in leachate/groundwater will remain in the subsurface Landfill gas is contained within the landfill mass by the existing groundwater intercept system Institutional controls including fencing deed restrictions and/or state orders will restrict access and land use However exposure to VOCs was included in the human health risk assessment as a conservative measure to evaluate potential risk to open-space receptors from exposure to VOCs in other media

Comment 8

Section 3 3 4 3 3 5 3 3 6 3 3 8 (Pages 3 7 3 8 3 9 3 12) What is the basis for the statement that "there is no risk to human health from inhalation or incidental ingestion of or dermal exposure to leachate at the seep?" A number of semivolatile and volatile organics were detected in the leachate and a qualitative evaluation regarding the possible dermal toxicity of these chemicals is not presented here The statement quoted above needs to be qualified with the phrase "for this open space receptor " Otherwise the statement could be construed as being true for unrestricted use which is not the case This also applies to similar statements on the other pages noted above

Response

The statement 'there is no risk to human health from inhalation or incidental ingestion of or dermal contact with leachate at the seep " is based on results of the PRG screen that indicate that contaminant concentrations at the seep do not exceed risk based concentrations for an open-space receptor

Comment 9

Section 3 3 7 (Page 3-10) Compositing of soils is not an appropriate way to assess risk for an open space receptor, since such a receptor be more likely to be exposed to just the upper surficial soils Compositing soils down to 10 inches also has the effect of diluting the exposure concentrations

Response

Risk to an open-space receptor will be revised to include exposure to upper surficial soils (0 to 2 inches) only

Comment 10

Section 3 3 7 (Page 3-11) The matrix effect for GI tract absorption has not been approved by either agency Its inclusion in these calculations, however, does not have any effect because it is set to 1 However, it should be deleted from the equations

Response

Use of chemical-specific matrix effects (MEs) was approved by EPA as an RFETS-specific exposure parameter and will remain in exposure calculations for the Draft Final IM/IRA DD A discussion will be included in the text to outline the rationale for using specific ME values for soils This rationale is conservative in that all ME factors are high based on findings in the literature This conservative approach accounts for different soil types

Comment 11

Section 3 3 9 (Page 3-14) The argument at the end of this section that the exposure pathway for ingestion of groundwater downgradient of the landfill is incomplete is weak. There may be a combination of reasons to eliminate consideration of this pathway, but the fact that there are currently no plans to develop water wells is inadequate

Response

Discussion of the incomplete exposure pathway for ingestion of groundwater downgradient of the landfill will be augmented

Comment 12

Section 3 4 (Page 3-15) Contrary to the statement in the top paragraph on this page both the substantive aspects and the administrative requirements of ARARs, including those of RCRA/CHWA, apply to the Present Landfill This comment will not apply once the single-regulatory agency concept ("carve-out") is implemented, presumably in the near future

Response

The "carve-out" has been implemented so that EPA is now the lead regulatory agency Therefore only the substantive aspects of RCRA/CHWA apply

Comment 13

Section 3 4 3 3 (Page 3-23) The delisting procedure described in the test is not the most effective method to deal with the landfill leachate Environmental media which contained one or more hazardous

waste must be managed as a hazardous waste until it is determined that the media no longer contains enough hazardous waste to present a threat to human health or the environment

1 Risk to human health is evaluated by determining if the media

   a) presents an excess risk of cancer greater than 1 x 10^{-6}, or
   b) constitutes a Hazard Index greater than 1 0

2 If the media contains hazardous constituents that do not exceed human health risk levels continuing management as a non hazardous waste material may be necessary Management action is required if environmental receptors (groundwater surface water ecological receptors etc) can potentially be damaged by the uncontrolled release of the contaminated media

   a) Surface water or groundwater containing hazardous constituents are compared to water quality standard attached to the applicable water use classifications (currently Aquatic Life Warm 2 Recreation 2 Agricultural and Water Supply for surface water Domestic Use Agricultural Use and Surface Water Protection for groundwater)

   b) Soils and sediments containing hazardous constituents which may leach into surface water or groundwater at levels above the standard described above must be managed or treated appropriately

Leachate will likely continue to contaminate various environmental media after the actions prescribed in this document have been implemented Until the surface water/groundwater, for instance no longer contains F039 waste at levels which present risks as described above a leachate treatment system will be required This will likely be beyond the life of the treatment system established by the Seep Collection and Treatment PAM and therefore this document needs to address such a system This issue will also require reviewing plans for the landfill dam

Response

Based on the current land use scenario the leachate contained in groundwater does not present an excess risk of cancer greater than 1 x 10^{-6} nor does it constitute a Hazard Index greater than 1 0 In addition although leachate will continue to drain from the landfill mass for several years, there will be no exposure pathway for an open space recreational user because the leachate will remain in the subsurface and will not be discharged to surface water Leachate contained in groundwater will remain in the subsurface If necessary leachate will be treated for those contaminants that exceed or will exceed (based on modeling results) ARARs at the Point of Compliance Treated groundwater will be discharged to the subsurface

Comment 14

Section 3 4 3 4 (page 3 24) This section mentions that a contingency plan will be developed to address leachate and groundwater that do not meet MACs This contingency plan should be developed within this decision document

Response

The reference to a contingency plan will be removed because as stated in the response to comment 13 above leachate treatment will be evaluated explicitly in the revised IM/IRA DD

Comment 15

Section 3 5 1 1 (Page 3-26) Because the landfill is an interim status closure unit, the requirements in 6 CCR 1007-3 §265 110 apply The closure performance standard requires that the post-closure escape of leachate be controlled, minimized or eliminated

Response

The referenced standard states that "the owner must close the facility in a manner that controls, minimizes or eliminates, to the extent necessary to protect human health and the environment, post-closure escape of leachate " A focused risk assessment for the leachate showed no risk to human health An ecological risk assessment will not be performed on leachate or groundwater because there will be no exposure point for the leachate, as discussed in the response to comment 41 Post-closure escape of leachate that must be controlled minimized, or eliminated will be addressed in the revised IM/IRA DD

Comment 16

Table 3-8 (Page 3-37) The combined adult and child exposure to surface soil by incidental ingestion has not been age-averaged over 30 years Rather, the children's and adult's risks have been calculated separately EPA guidance (RAGS) recommends age-averaging, even though children's risks are then lower This is because of long latencies of some chemical effects such as carcinogenicity

Response

The soil ingestion rate for carcinogenic risk estimates will be age-averaged in the Draft Final IM/IRA DD

Comment 17

Tables 3 15 3-16 and 3-17 (Pages 43-53) How were the potential ARARs shown in these tables selected?

Response

In the original document potential chemical-specific ARARs for OU 7 were developed using the Rocky Flats Draft Master List of Potential ARARs (February 1995), which includes Safe Drinking Water Act maximum contaminant levels (MCLs) (40 CFR 141), state MCLs (5 CCR 1003-1), RCRA MCLs (40 CFR 264 94), state water quality standards (5 CCR 1002-8, 3 1 11) and state basic standards for groundwater (5 CCR 1002-8, 3 11) For both groundwater and surface water, the most stringent standard was chosen for each chemical and compared to the practical quantitation limit (PQL) for that chemical The higher value of the two was selected as the ARAR This approach has been modified for the Draft Final IM/IRA DD to be consistent with the Action Level Framework for surface water, groundwater and soils The framework recommends using Safe Drinking Water Act MCLs If there are no MCLs for a given contaminant then the method described above will be used

The text in Section 3 4 1 will be revised to clarify how ARARs were selected

Comment 18

Table 3-21 (Page 3-63) The Colorado Hazardous Waste Act in 6 CCR 1003-7 should be included as an applicable ARAR

Response

The interim status regulations and standards of the Colorado Hazardous Waste Act have been added to the table

Comment 19

Section 4 2 3 (Page 4 2) The institutional controls mentioned here may need to be strengthened with a compliance order It is also unclear here in the text and in Table 4 2 exactly how water use will be controlled

Response

The text will be modified to include a compliance order A more detailed discussion of institutional controls is in Section 5 2

Comment 20

Section 4 2 5 Section 7 3 5 and Section 8 2 3 1 (Pages 4 3 7 13 and 8-9) How many gas vents will be installed and how was this number determined? Will a gas collection system require any piping in which condensate may collect?

Response

The number of gas vents will be determined during the final design effort The rationale for the number of vents and the handling of condensate in the gas pipes will be provided at that time

Comment 21

Section 4 2 6 (Page 4 4) This section states that vent pipes or gravel columns will extend through the cover and will be logical points for monitoring emissions from landfill Geonets are normally used for liquid drainage applications and are only on the order of about 4 to 8 millimeters The manner in which the vent pipes or gravel columns are attached to the gas collection geonet and then extended through the cover system should be addressed Also explain how the gravel columns will be prevented from acting as conduits for liquids

Response

The gas generated in the waste mass will generally consist of methane which will flow upward along pathways of least resistance until it reaches the gas collection layer where it will be channeled through the cover system by gas collection pipes These gas collection pipes will be placed at high points in the cover system

Geonets and geotextiles suggested for the gas collection layer are more permeable than the overlying soil and FMC barrier layers Some infiltration of gas into the soil layer will occur but the majority of the gas will flow through the openings in the geonet and the geotextile The thickness of the geonet layer within the geotextile/geonet/geotextile geocomposite does not greatly affect the composite s ability to transmit gas

Richardson and Koerner (1987) list geonets and geotextiles suitable for use in gas venting systems

The connection between the vent pipes/gravel columns will be addressed in the Title II design document

It is anticipated that the majority of precipitation falling onto the landfill cover will either run off the gentle slopes evaporate from the top soil and vegetative layers or drain through the geocomposite drainage

layer on top of the FMC Alternatives 5, 7, and 9 are identical with respect to the drainage features above the FMC, and HELP modeling indicates that the majority of the precipitation will be removed by these layers Of the moisture that penetrates these drainage and barrier layers and enters the gas collection geocomposite a small portion will likely drain downslope in the geonet layer; however, a larger portion of this moisture will drain through the geonet into the underlying geotextile and soak into the general fill layer

Currently there are no plans to prevent moisture from entering the gravel columns, however since the cross-sectional area of these columns will be small in comparison to the area of the general fill the likelihood of moisture reaching the columns and the impact it will have on the overall water balance is reduced Once surface water has migrated through the cover section, it will ultimately migrate into the waste regardless of whether it flows in the gravel columns or directly through the general fill placed to achieve the design surface grades The only impact of the gravel columns will be to decrease the time for that water to reach the waste However, in large areas of the landfill, the grading fill will be of limited thickness and therefore will not impede the rate of migration

Comment 22

Sections 5 1 2 6.2 2 2, 8 17, 9 2 2 (Pages 5-2 6-10, 8-5 9-8) Before this decision document can commit to draw on the wetlands mitigation bank, the managers of that project must be advised and provide assurances that sufficient ācreage is available

Response

OU 7 is listed in the wetland bank program which is awaiting approval by EPA.

Comment 23

Sections 5 1 2 and 9 2 1 3 (Pages 5-2 and 9-7) Mitigation of sensitive habitat is discussed but the text does not say what criteria should trigger an action nor what potential mitigating actions might be taken

Response

Since the submittal of the Draft IM/IRA DD, a trapping program was conducted at OU 7 and no Preble s meadow jumping mouse were found after 400 trap nights In addition the potential habitat area at OU 7 is relatively small (1/3 hectare) and isolated from other Preble s populations Therefore, detailed discussion of mitigation of Preble s habitat is no longer necessary

Comment 24

Section 5 1 3 (Page 5-2) An appropriate slope stability analysis which supports the grading plan presented in this section should be included in the Title II design document.

Response

A slope stability analysis will be included in the Title II design document

Comment 25

Section 5 1 5 1 (Page 5 4) A 36-inch vegetative-soil layer does not allow for a factor of safety for barrier layer protection in case depth of frost penetration is greater than 3 feet It is recommended that a foot-thick biota layer consisting primarily of cobble-size material be incorporated into the cover design A biota layer would provide the dual benefits of cover protection from burrowing animals as well as increasing the thickness of soils above the barrier layer materials resulting in additional frost protection The top soil and vegetative soil layer specifications must be addressed in the Title II design document

Response

The frost depth in the area of OU 7 is 3 feet Therefore the existing design will provide adequate frost protection However a review of site specific biologic conditions at OU 7 indicates that a biotic barrier is necessary The conceptual design of this layer will be addressed in the Draft Final IM/IRA DD

The top soil and vegetative soil layer specifications will be included in the Title II design document

Comment 26

Section 5 1 5 4 (Page 5 6) Geocomposites are a combination of geonet and geotextile and are not normally considered appropriate for gas collection Please see comment #21 above

Response

Richardson and Koerner (1987) list geonets and geotextiles suitable for use in gas venting systems

Comment 27

Section 5 1 5 4 (Page 5 7) It is our understanding that the design which facilitates gas treatment will be addressed in the Title II design document

Response

Design of components of the gas collection layer that will facilitate future gas treatment will be included in the Title II design document

Comment 28

Section 5 1 5 5 (Page 5 7) This section states that "the general fill material can consist of almost any natural soil material" General fill specifications must be addressed in the Title II design document

Response

General fill specifications will be addressed in the Title II design document

Comment 29

Figure 5 1 This illustration indicates that part of OU 6 s IHSS 166 1 will fall under the "Extent of Landfill Cap" The text in Section 2 1 6 (Page 2 6) should clarify if this is in agreement with the investigations and decisions at OU 6

Response

IHSS 166 1 is covered by the OU 7 cap only incidentally The subsurface soil in this IHSS has been recommended for no further action The text will be clarified

Comment 30

Section 5 2 7 (Page 5 11) This section states advantages of the Alternative 7 soil cover "The presence of the low permeability soil (approximately 1E-05 cm/sec) gives the cover system some of the benefits of a composite cover without the rigorous installation requirements of a full compacted clay The barrier layer

is an FMC with a permeability of approximately 1E 13 cm/sec The gas-collection system is designed to facilitate gas treatment if needed "

Calling a soil with a permeability of 1E-05 cm/sec a "low-permeability" soil is a misnomer Permeabilities of this magnitude are associated with clayey sand and silty sand soils These soil types are primarily coarse-grained and tend to have significantly higher permeabilities than fine-grained soil types

Page G-4 of the appendices states that the results of this [sensitivity] analysis show that the permeability of the soil underlying the FMC has significant effect on leakage rates through defects in the FMC The decreased protectiveness of substituting the "low-permeability" soil in place of clay below the FMC should be compensated for by the addition of a GCL (or equivalent) component to the barrier layer

Page G 3 of the appendices states that the FMC is modeled using default geosynthetic material characteristic #35 which has a hydraulic conductivity of 2E-13 cm/sec A typical thickness for FMCs of 60 mils (06 inches) was used The proposed FMC to be used in the cover should be consistent with the 60-mil FMC used in the HELP model

Response

The permeability of soils can range from 1E+2 to 1E-9 cm/sec (Cedergren 1977) A soil with a permeability of 1E 5 cm/sec is on the lower end of this range and is indicated as a "poor drainage" material Therefore, a soil with a permeability of 1E-5 cm/sec can be classified as "low permeability " However we do realize that there are soils with lower permeabilities

As indicated in Cedergren (1977) soils with permeabilities in the range of 1E-5 cm/sec consist of very fine sands organic and inorganic silts mixtures of sand silt, and clay· glacial till stratified clay deposits, and "impervious" soils that have been modified by the effects of weathering (freezing and drying) We have selected a low-permeability soil with a permeability classification of 1E-5 cm/sec because that is a realistic permeability value that any soil could achieve in the long run in a cover application where it is exposed to the effects of weathering

The state has suggested the use of a GCL on top of the low-permeability soil to improve the performance of the cover section We have considered the use of a GCL in the cover section and have evaluated the performance with the HELP model The results are presented in the text and indicate that the performance of a cover section with a GCL or a low-permeability soil are similar

The proposed FMC material type and thickness will be determined in the final design However, the HELP runs that have been completed are considered appropriate even if the selected FMC material is not a 60-mil material because the major component impacting the leakage rate of FMCs is the defect rate and not the material thickness

Comment 31

Section 6 0 A comprehensive QA/QC plan should be developed for the Low Permeability Soil Layer and all geomembranes See EPA s "Technical Guidance Document QA and QC for Waste Containment Facilities " EPA/600/R-93/182

Response

A comprehensive QA/QC plan will be prepared as part of the final design and specification package This plan will include sections specifically addressing the low-permeability soil layer and all geomembrane layers and, at a minimum, will conform to EPA's "Technical Guidance for QA and QC for Waste Containment Facilities" (EPA/600/R-93/182)

Comment 32

Section 6 2 (Pages 6 12 6 16 6 19 6 21) Evaluations of short term effectiveness mention that risks to workers due to exposure to contamination should be minimal Will risks to workers be further evaluated and have all appropriate exposure pathways been considered? Will a health and safety plan be developed for construction workers beyond the plans described for decontamination activities on page 6 8?

Response

Risks to workers involved in remediation activities do not need to be evaluated in the IM/IRA DD because the site specific health and safety plan in conjunction with an activity hazard analysis will include information about site contaminants and specific procedures for personal protective equipment and monitoring required for remedial construction

Comment 33

The potential for dust generation erosion etc during the construction mentioned under Short Term Effectiveness seem to be serious enough to warrant a greater weighting factor when evaluating comparative risks (Table 6 4)

Response

All seven CERCLA criteria are considered important The weighting factor attempts to take into account relative importance in order to compare the alternatives and choose the preferred alternative For example is short-term effectiveness equally as important as long term effectiveness?

As stated in Section 6 3 2 the primary concerns were dust generation and potential for erosion and subsequent sediment loading during construction The lower weighting factor for short term effectiveness reflects that both of these concerns can be readily mitigated using standard construction techniques for dust suppression (such as watering) and erosion control (such as sedimentation basins)

Comment 34

Section 6 2 2 2 (Page 6 13) It is debatable whether the vegetative soil layer prevents punctures of the FMC by plant roots and burrowing animals Please see comment #25 above

Response

An adequate biotic barrier will be added to the cap cross section

The dimensions given on the cover alternates are preliminary Further refinement for the design layer thicknesses will occur during the Title II design where issues such as frost burial depth evaporation zone depth burrowing animal depth and plant root depth will be specifically addressed

Comment 35

Section 6 2 3 1 (Page 6 13) It is debatable whether the installation requirements for the "low permeability" soil would be less rigorous than those of a full clay liner

The 1 foot lift thickness mentioned in this section may not provide sufficient cushion to prevent geonet damage or eliminate intrusion of adjacent materials into the geonet apertures during lift placement All soil layer material specifications must be addressed in the Title II design document

Response

Installation requirements for a full clay liner are discussed in Section 5.3.5 2, Implementability and installation requirements for a low-permeability soil are discussed in Section 5 3 8.2, Implementability

Placement of soil materials over geosynthetics can be performed without damage to the geosynthetics with good construction quality assurance (CQA) monitoring and control

Intrusion of adjacent materials into geonet apertures in a geocomposite is affected by the type of overlying geotextile and the amount of soil overburden placed on top of the geocomposite We concur that all soil layer material specifications must be addressed in the Title II design document. In addition, geosynthetic material specifications and CQA plan must also consider compatibility of soil materials and placement practices with the geosynthetics

Comment 36

Section 6 2 3 2 (Page 6-14) Specify the ways in which Alternative 7 does not comply with EPA guidance cited, and then explain how this alternative is nevertheless equally protective

Response

Table 7-2 page 7-18 identifies the regulatory criteria for the barrier layer soil component as having a 2-foot barrier with saturated conductivity of less than or equal to 1E-07 cm/sec. Alternative 7 design for this component is 1-foot thick with a hydraulic conductivity of 1E-05 cm/sec This is the only component in the cover system that deviates from the EPA guidance documents The barrier soil component proposed in Alternative 7 will be a low-plasticity soil that will be less susceptible to desiccation cracking than a high-plasticity clay layer of the type typically installed in conformance with EPA guidance The leakage rate for the Alternative 7 cover is greater than the Alternative 9 cover; however, when both leakage rates are compared as a percent of the average annual rainfall they both perform at a similar level

Comment 37

Section 6 3 1 (Page 6 21) This section states that the low-permeability soil layer may be less permeable than the clay barrier layer due to its resistance to desiccation However, clay is the standard soil material used for landfill covers Desiccation will be minimized since the clay will be buried at depth and not subject to surficial drying It is debatable that Alternative 7 affords the highest degree of long-term effectiveness and permanence This point is the major basis for giving Alternative 7 a higher score in Long-Term Effectiveness and Permanence

Response

In general factors that influence clay layer desiccation include the clay mineralogy, plasticity, sand content, initial moisture content, temperature variations nature of the clay's contact with overlying geomembrane or underlying surface, and overburden pressures These factors have been investigated by several researchers and it has been suggested that a clay layer having a lower swelling potential, lower plasticity index lower initial moisture content, and a thicker vegetative soil cover that provides sufficient temperature insulation and overburden pressure to maintain a tight contact between the clay and the overlying geomembrane will be less likely to desiccate than a clay layer that does not have these characteristics The ability of a clay to rehydrate after cracking is very dependent on the characteristic of the clay A pure bentonitic clay such as GCL will hydrate and achieve a permeability similar to a pre drying condition however normal compacted clay covers may not have the potential to totally rehydrate and achieve a permeability equal to the pre-drying permeability

The low permeability soil layer proposed for Alternative 7 is intended to incorporate many of the factors identified above to reduce the potential for clay desiccation compared to the clay layer proposed in Alternative 9

Comment 38

Section 6 3 3 1 (Page 6 21) This section states that if "new clay borrow sources are selected to repair the clay layer in Alternative 9 it may be necessary to complete a new test fill and chemical compatibility tests for that clay material" However the clay layer is proposed to be placed above the landfill waste so chemical compatibility should not be a concern Even so if chemical compatibility testing is to be performed it would have to be performed on the low permeability soil also

Response

We concur that compatibility testing for a new clay material to be used for clay layer repairs may not be a major concern due to the fact that the clay layer is placed above the waste layer

Comment 39

Section 6 3 3 1 (Page 6 21) The text states that "the clay barrier in Alternative 9 is more difficult to construct than the low permeability soil layer or the bedding soil layer due to required moisture conditioning and maintenance of exposed clay during construction The low permeability soil layer would also be subject to moisture conditioning and maintenance during construction

Response

We concur that the low permeability soil will require moisture conditioning during placement However the acceptable range of moisture contents for a given soil will be wider for a soil required to meet 1E-5 cm/sec than a soil meeting 1E 7 cm/sec In addition the absolute moisture content of the soil required to meet 1E 5 cm/sec will be less than the same soil meeting 1E 7 cm/sec This is expected to reduce the potential for desiccation cracking and associated repair during construction Both of these factors are expected to facilitate placement compaction trimming and CQA monitoring activities (see response to comment 35)

Comment 40

Section 6 4 and Table 6 4 (Pages 6-23 and 6 28) Consideration of the previous two comments may have an effect in the comparative risk evaluation

Response

Comparative risks will be reevaluated to reflect comments and changes in the design as appropriate

Comment 41

Section 7 1 (Page 7 2) Where will the seep water be directed once it is collected by the gravel blanket or French drain mentioned in the second paragraph on this page?

Response

Based on agreements between DOE EPA and CDPHE the Draft Final IM/IRA DD will recommend complete removal of the East Landfill Pond Leachate contained in groundwater will remain in the subsurface media If necessary leachate will be treated for those contaminants that exceed or will

exceed (based on modeling results) ARARs at the Point of Compliance Treated groundwater will be discharged to the subsurface

Under currently expected land uses and agreed-upon exposure scenarios, there are no exposures to groundwater unless it surfaces in seeps streams, or ponds The East Landfill Pond will be removed and the drainage regraded to prevent seeps. No Name Gulch is a losing stream year-round (see response to comment 7) so groundwater is not expected to surface in the stream In addition future development of groundwater will be prohibited by institutional controls

Comment 42

Section 7 1 (Page 7 2) Leachate control does not exceed regulatory requirements despite the contrary statement on the fourth paragraph on this page Because the landfill is an interim status closure unit, the requirements in 6 CCR 1007-3 §265 110 apply The closure performance standard requires that the post-closure escape of leachate be controlled, minimized or eliminated

Response

The referenced standard states that "the owner must close the facility in a manner that controls, minimizes or eliminates to the extent necessary to protect human health and the environment, post-closure escape of leachate " A focused risk assessment for the leachate showed no risk to human health An ecological risk assessment will not be performed on leachate or groundwater because there will be no exposure point for the leachate as discussed in the response to comment 41

Leachate generation will be minimized by capping the landfill In addition, the IM/IRA DD will evaluate slurry walls and leachate treatment as potential methods to address this standard.

Comment 43

Section 7 1 (Page 7 2) There will be no potential exposure to groundwater not "because there are no plans for future development of groundwater" as stated in the sixth paragraph, but rather because institutional controls will prohibit it

Response

The text will be revised

Comment 44

Section 7 2 1 and Section 8 1 12 (Pages 7-3 and 8-6) The deed notation mentioned here may not be an adequate institutional control to limit future development The State may issue an order to limit future development

Response

The text will be revised to include other institutional controls to limit future development, such as a compliance order

Comment 45

Section 7 2 2 3 (Page 7 7) The text states "The permeability of the FMC barrier is 1E-13 cm/sec, which is less than the permeability of natural subsoils at the landfill (1E-06 to 1E-07 cm/sec) " However this thin flexible membrane is subject to damage from construction equipment and from differential settlement which could significantly increase its permeability

Response

In our assessment of the permeability of the cover section compared to the foundation soils we have evaluated the overall permeability of the cover system compared to the overall permeability of the foundation soils The calculation for the overall permeability of the cover section includes the combined effect of the FMC and the low permeability soil (composite cover section) The composite cover section (even with a normally accepted number of defects) is considered much less permeable than a native soil with a permeability of 1E 7 cm/sec

As a point of reference we analyzed the leakage rate for the cover section for Alternative 4 which consisted of a single clay barrier layer with a permeability of 1E 7 cm/sec (this could be considered comparable to the foundation soil with a permeability of 1E 7 cm/sec) The leakage rate was determined to be approximately 1 in/yr This is compared to the leakage rate for the cover section for Alternative 7 (FMC [with defects]) over a low permeability soil at approximately 2E-4 in/yr This indicates that the composite cover system has a much lower net permeability than a single soil layer

Comment 46

Section 7 2 2 3 and Section 8 2 3 3 (Pages 7 8 and 8 10) The selection of groundwater monitoring wells should be reviewed with RCRA Monitoring Program personnel This program recently proposed eliminating some wells from its sampling schedule or sampling on a less frequent schedule The proposed upgradient monitoring well 70393 apparently receives contamination from a further upgradient source

Response

The monitoring wells selected for post closure groundwater monitoring will be reviewed and revised if necessary for the Draft Final IM/IRA DD Well 70093 may be a more appropriate upgradient well There are no organic compounds detected in well 70093

Comment 47

Section 7 2 2 3 (Page 7 9) See comment #13 above

Response

See response to comment 13

Comment 48

Section 7 3 1 1 (Page 7 10) This section says that maximum settlements may range from 2 9 to 5 5 feet Localized ponding of water on top of the cover will not be permitted Also see comment #45 above

Response

In general settlement is a function of waste thickness and waste type Several methods were used to estimate the amount of settlement at various points in the landfill cover Based on these evaluations and allowing for worst case settlements the cover system will have post settlement slopes between 3 and 5 percent

We concur there is a possibility of local settlement that might result in localized ponding but we feel that this is remote due to the thickness of the general fill which will further consolidate the waste and components of the waste that reduce settlement potential such as the construction debris component and the daily cover soil component Localized settlement generally occurs when biodegradable materials or

containers located near the upper surface of the waste fill deteriorate and collapse resulting in depressions at the surface However, these localized settlements are observable on the surface and are relatively easy to repair

Comment 49

Section 7 3 1 3 (Page 7-10) Little detail is provided on establishing a vegetative cover Revegation efforts both onsite and offsite have essentially failed and the lack of a plan that improves on past efforts may be a critical deficiency

Response

Revegetation of the final contoured cap of the landfill is an important component for the success of this project A revegetation plan that addresses the problems encountered at other OUs will be included in the Title II design document

Once the source of the topsoil for the landfill cap has been determined and the soil characteristics can be evaluated, ecologists will establish an appropriate seed mixture for the final vegetative cover Soil characteristics and the need for shallow-rooted species that provide good erosion control will be taken into account during the selection of a revegetation seed mixture

Revegetation success will be evaluated annually for sufficient ground cover and noxious weed presence Re-application of seed will be undertaken and active weed control will be used if revegetation success is not acceptable

Comment 50

Section 7 3 1 3 (Page 7-10) This text says that the northeast slope of the landfill will be reduced to 20% This amount is at variance with the 6H·1V slope shown on Figure 7-3 What erosion protection measures will be necessary on this slope before vegetation is established?

Response

We concur the northeast slope is reduced from 33% to a 6H 1V which corresponds to a 16 7% slope, not a 20% slope as indicated in the text This will be clarified to indicate a 6H 1V slope in all cases However, these slope angles have only been estimated at this time for comparison of alternatives Final slopes will be determined during the Title II design

Erosion control measures for the eastern slope area will be considered during the Title II design

Comment 51

Section 7 3 3 (Page 7-12) A manufacturer's QA report should be provided with any type of FML and geocomposite

Response

Manufacturer's material specification and quality assurance test data are typically provided to customers upon request In addition it is common to obtain samples of this material when it arrives on site and to perform conformance tests to ensure that the material meets specifications. The manufacturer's product data conformance sampling protocols, sample frequency, and types of tests to be performed will be called out in the Title II design specifications and construction quality assurance plan

Comment 52

Section 7 3 4 (Page 7-13) Where will the seep water collected by the gravel blanket or French drain be directed?

Response

Based on agreements between DOE EPA, and CDPHE the Draft Final IM/IRA DD will recommend complete removal of the East Landfill Pond Leachate contained in groundwater will remain in the subsurface media If necessary leachate will be treated for those contaminants that exceed or will exceed (based on modeling results) ARARs at the Point of Compliance Treated groundwater will be discharged to the subsurface

Under currently expected land uses and exposure scenarios agreed upon by the Future Land Use Working Group (DOE 1995) there are no exposures to groundwater unless it surfaces in seeps streams or ponds The East Landfill Pond will be removed and the drainage regraded to prevent seeps No Name Gulch is a losing stream year round (see response to comment 7) so groundwater is not expected to surface in the stream In addition future development of groundwater will be prohibited by institutional controls

Comment 53

Section 7 5 (Page 7 15) Slurry walls are problematic as evidenced by the need for further maintenance action on the present slurry wall To imply that all of the subsurface flow will be "addressed by the proposed slurry wall" is probably overstating its capabilities

Response

The text was not intended to suggest that 100% of the subsurface flow would be deflected by the slurry wall The text will be modified to clarify this point

It should be noted that the slurry wall maintenance action primarily addresses flows due to the failure of the existing leachate-collection system trench as discussed in Section 2 1 4 Modeling shows that there may be some flow at the slurry wall however based on as built drawings this is probably due to the fact that the wall was not consistently keyed into the bedrock Slurry walls are an EPA approved method of controlling groundwater and any slurry wall at OU 7 would be installed under a rigorous QA/QC program

Comment 54

Section 8 (Page 8 1) If the single regulatory agency concept ("carve out') is implemented then the substantive requirements of RCRA will still apply but the administrative requirements will not This distinction may change how the closure plan and post-closure plan are administered

If this document is to serve as the Closure Plan for all of OU 7 then a discussion of how closure requirements will be met for IHSSs 203 167 2 and 167 3 must also be included A rationale for no action at these IHSSs should be included in previous sections

Response

The carve out has been implemented and the document will be revised accordingly

A discussion of how closure requirement are met for IHSSs 203 167 2 167 3 and the rationale for no action at these IHSSs will be included

Comment 55

Because leachate collection and slurry wall maintenance are considered essential to closure of the landfill and are elements of the presumptive remedy strategy, these actions should be included with the recommended landfill cover alternative in any discussion of activities related to or required for closure The sections of this document would be enhanced by including more detail about these two actions

Response

The Draft Final IM/IRA DD will not assume that the slurry wall and leachate collection and treatment are performed outside of the scope of the IM/IRA. Alternatives that incorporate the slurry wall and leachate treatment will be evaluated, and the best alternative will be chosen The recommended alternative will include all the necessary components for its implementation

Comment 56

Section 8 1 1 (Page 8-3) The discussion of the leachate in the third paragraph in this section should be modified to be consistent with comment 13 above

Response

The discussion will be modified to be consistent with the response to Comment 13.

Comment 57

Section 8 2 3 (Page 8-8) Because the landfill is an interim status closure unit, the requirements in 6 CCR 1007-3 §265 110 apply The closure performance standard requires that the post-closure escape of leachate be controlled minimized or eliminated Monitoring of the effectiveness of the slurry wall should be considered Although the repairs to the slurry wall will be done as a separate maintenance action, its effectiveness is important in minimizing leachate as required by the closure performance standard and in providing long-term minimization of migration of liquids through the closed landfill (6 CCR 1007-3, §265 310)

Response

The referenced standard states that "the owner must close the facility in a manner that controls, minimizes or eliminates to the extent necessary to protect human health and the environment, post-closure escape of leachate" A focused risk assessment for the leachate showed no risk to human health An ecological risk assessment will not be performed on leachate or groundwater because there will be no exposure point for the leachate, as discussed in the response to comment 41

Leachate generation will be minimized by capping the landfill In addition, the IM/IRA DD will evaluate slurry walls and leachate treatment as potential methods to address this standard

Slurry walls are an EPA-approved method of controlling groundwater, and any slurry wall at OU 7 would be installed under a rigorous QA/QC program. Meaningful monitoring of the effectiveness of the slurry wall would require measurement of heads inside and outside at multiple points along the wall The inclusion or omission of piezometers is a final design question The cost of monitoring should be weighed against the benefits

Comment 58

Section 8 2 3 2 (Page 8-10) This text states that "groundwater will not be used as a source of drinking water" What specific controls will be in place to preclude using groundwater as a drinking source? The

test also concludes that no exposure to groundwater is possible because groundwater does not discharge to surface water in No Name Gulch Is No Name Gulch a losing stream year round?

Response

Under currently expected land uses and exposure scenarios agreed upon by the Future Land Use Working Group (DOE 1995) there are no exposures to groundwater unless it surfaces in seeps streams or ponds The unnamed tributary of Walnut Creek (No Name Gulch) is a losing stream year round (see response to comment 7)

The text will be revised to state that there will be no potential exposure to groundwater because deed restrictions and/or state orders will prohibit potential exposure

Comment 59

Section 8 2 3 2 (Page 8 10) The wells proposed here as points of compliance may need to be adjusted to be able to effectively serve that purpose given that a leachate treatment system may need to be installed as part of this IM/IRA document

There will be no potential exposure to groundwater not "because there are no plans for future development of groundwater " but rather because deed restrictions and/or state orders will prohibit it

Response

The Draft Final IM/IRA DD will propose points of compliance that are appropriate for the recommended alternative

The text will be revised to state that there will be no potential exposure to groundwater because deed restrictions and/or state orders will prohibit potential exposure

Comment 60

Section 9 2 1 1 (Page 9 6) Lack of an improved revegetation plan (see comment #31) may mean that habitat loss will more than temporary as stated in the fourth paragraph of this section

Response

As discussed in the response to comment 49 a revegetation plan will be submitted as part of the Title II design document This plan will take into consideration revegetation problems experienced at other OUs

References

Cedergren Harry R 1977 "Seepage Drainage and Flow Nets " Second Edition John Wiley & Sons New York

Richardson Gregory N and Robert M Koerner 1987 "Geosynthetic Design Guidance for Hazardous Waste Landfill Cells and Surface Impoundments " Hazardous Waste Engineering Research Laboratory U S EPA Cincinnati OH December

DOE (U S Department of Energy) 1995 Changes to the Site Wide Exposure Factors and Exposure Scenarios Letter from J Roberson (DOE) to S Stiger (EG&G) April 13